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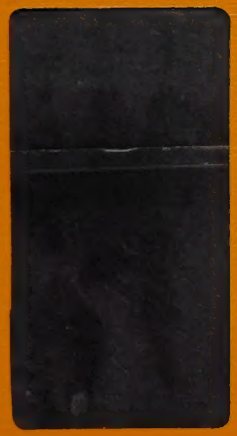
SYSTRON DONNER



INSTRUCTION MANUAL

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MODEL 218
DATA/PULSE GENERATOR
SERIAL NO. 137
Ⓐ

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SYSTRON DONNER CORPORATION

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CORPORATION

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40000-499	Schematic, Output Amplifier
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CHAPTER 1

GENERAL DESCRIPTION

1) INTRODUCTION

The Model 218 combines the capabilities of a high-speed pulse generator and the versatility of a 16-bit data generator to offer a low cost instrument of unlimited capability. Operated as a data generator, the Model 218 produces 16-bit words in either NRZ or RZ format with data content controlled by front panel pushbuttons. A remote programming option is available. Words may be recycled continuously, manually or by external command, either synchronously or asynchronously. Two or more Model 218's may be operated in parallel for multi-channel outputs or in series for longer word lengths. Operated as a pulse generator (or in the RZ data mode), pulse width is continuously variable from 10 ns to 100 ms in seven ranges.

TABLE 1.1 SPECIFICATIONS

Repetition Rate	Continuously variable from 10 Hz to 50 MHz in seven ranges.
Sync Gate	In the pulse format or the continuous recycle mode the instrument can be sync gated by a +2 V signal. The first clock pulse occurs approximately 20 ns after the gate signal. (This provides the capability of varying the word lengths.)
External Trigger	The instrument may be triggered by an external source with +2 V peak amplitude signal at rep rates from 0 to 50 MHz.
Manual Trigger	Data cycle (16-bit word) advances one bit each time the MANual pushbutton is depressed.
Data Cycle	Fixed at 16 bits. DATA CONTENT pushbuttons determine the state (true or false) of each bit. Two or more instruments may be operated in parallel to form a multiple channel system, or in series to form longer word lengths without pattern limitations.
Recycle Modes:	
Continuous	Serial words repeated sequentially without interruption.
Async Command	A 16-bit word is generated for each command signal (+2 V pulse). The clock is not synchronized with the recycle command.

TABLE 1.1 SPECIFICATIONS (Cont'd)

Recycle Modes (Cont'd):	
Sync Command	A 16-bit word is generated for each command signal (+2 V pulse). The clock is synchronized with the recycle command. The clock sync output is a burst of pulses after each recycle command.
Manual	A 16-bit word is generated each time the MANual pushbutton is depressed.
Data Format:	NRZ, RZ or PULSE, selectable by a front panel switch.
NRZ	Each data bit remains in the same state (true or false) for the entire clock period.
RZ	The portion of the clock period in which a bit remains in the true state is determined by the width controls. Maximum RZ width duty cycle is 70% of clock period at rep rates from 10 Hz to 10 MHz, decreasing to 50% of clock period from 10 MHz to 50 MHz.
Pulse	In the pulse mode, the instrument functions as a pulse generator. Pulse width is variable by means of the width controls. The digital portion of the instrument is disabled in this mode.
Pulse Width	In the pulse or RZ data mode, the width is continuously variable from 10 ns to 100 ms in seven ranges. Maximum duty cycle is 70% of clock period at rep rates from 0 to 10 MHz, decreasing to 50% at rep rates from 10 to 50 MHz.
Bit 16 Selectable RZ or NRZ	In the recycle command modes and for NRZ format, bit 16 may be selected to be either true NRZ (remain true or false until bit 1 of the next recycle occurs) or may be returned to zero one clock period after bit 16 begins.
Data Outputs	Simultaneous positive true and complement outputs are provided from 50 ohm sources. Rise/fall times are approximately 5 ns when terminated with 50 ohms.
Output Levels (into 50 ohms)	Upper level is continuously variable from -4 V to +5 V (-8 V to +10 V open circuit). Lower level is continuously variable from -5 V to +4 V (-10 V to +8 V open circuit). Maximum difference between levels is 5 V (10 V open circuit).

TABLE 1.1 SPECIFICATIONS (Cont'd)

Sync Outputs	
Clock Sync	Occurs at the data rate.
Bit 1 Sync	Occurs approximately 20 ns before the first bit in each data cycle (16-bit word).
Bit 16 Sync	Occurs approximately 40 ns before the last bit in each data cycle (16-bit word).
Output Protection	Short circuits to ground, voltages up to ±10 V or any combination of control settings will not damage the output.
Operating Temperature	0° to 50°C.
Power Required	Approximately 50 W, 50-400 Hz at 105-125/210-250 V ac, selectable by means of a multitap transformer and a range switch located on the back panel.
Physical Characteristics	Front panel is brushed aluminum finish with black markings. Input and output connectors are BNC type.
Dimensions	16-3/4" W x 3½" H x 14-5/8" D.
Shipping Weight	Approximately 17 pounds. The instrument may be rack mounted by installing a Type 1010 Rack Mounting Set.
Accessories Furnished	One 8-foot, 3-prong conductor power cord and one maintenance handbook.
Accessories Available	Type 1010 Rack Mounting Set, 2003A Power Termination, 2101 Inverting Transformer (for sync outputs only), 2302 Pulse Mixer, 2401 Rise Time Integrator and extra handbooks.
Remote Programming Option	Logic Levels
Logic Levels	Zero volts inhibits, +2 V enables.
Programming Time	<50 ns per bit.
Programming Lines	16 lines (one for each bit) and one line for ground return.
Programming Connector	Winchester 18 pin female, Type XMRE rear mount.
Accessories Furnished	Mating program connector.

CHAPTER 2

CONTROLS AND CONNECTORS

2.1 POWER Switch	Applies ac voltage to the transformer primary and illuminates the power lamp.
2.2 CLOCK RATE Controls	The pushbuttons select either MANual, EXT or one of seven available ranges the vernier provides continuous control within the range selected. When the EXT pushbutton is depressed, the instrument can be triggered by an external source at repetition rates from 0 to 50 MHz. When the MAN pushbutton is depressed, manual triggered is selected and each time it is depressed thereafter the data output advances one (1) bit period.
2.3 WIDTH Controls	The pushbuttons select one of seven available ranges and the vernier provides continuous control of the pulse width within the range selected when the instrument is in the RZ or PULSE.
2.4 DATA CONTENT Pushbuttons	Determines the state of each bit in the data output. The bit is true when the pushbutton is depressed and false when the pushbutton is released.
2.5 FORMAT Pushbuttons	Select output format to be either NRZ, RZ or PULSE.
2.5.1 NRZ	When NRZ pushbutton is depressed each true bit in the data output remains true for the entire bit period.
2.5.2 RZ	When the RZ pushbutton is depressed, each true bit in the data output remains true for the period of time determined by the WIDTH controls.
2.5.3 PULSE	When the PULSE pushbutton is depressed, the instrument functions as a pulse generator.
2.6 RECYCLE Pushbuttons	
2.6.1 CONT	In this mode 16-bit words are repeated sequentially without interruption.
2.6.2 COMMAND	
2.6.2.1 SYNC	In the SYNC COMMAND mode, a 16-bit word is generated for each command signal (+2 V pulse) at the recycle input. The clock is synchronized with the recycle command signal resulting in synchronous data.

2.6.2.2 ASYNC	In the ASYNC COMMAND mode, a 16-bit word is generated for each command signal (+2 V pulse) at the RECYCLE input. The clock is not synchronized with the recycle command signal, resulting in asynchronous data.
2.6.2.3 MAN	A 16-bit word is generated each time the MAN RECYCLE COMMAND pushbutton is depressed.
2.7 SYNC GATE Switch	In the ON position, the output can be gated by a signal (+2 V pulse) at the SYNC GATE input when the instrument is in the pulse format or the continuous recycle mode.
2.8 BIT 16 Switch	In the recycle command modes and for NRZ format, Bit 16 may be selected to be either NRZ or RZ.
2.8.1 NRZ Position	Bit 16 remains true or false until Bit 1 of the next recycle occurs.
2.8.2 RZ Position	Bit 16 returns to zero one clock period after Bit 16 begins
2.9 OUTPUT LEVELS Controls	The maximum difference between the upper and lower levels of the data output is limited to 5 V when the output is terminated with 50 ohms (10 V open circuit).
2.9.1 UPPER LEVEL	Provides continuous control of the data output upper level from approximately -4 V to +5 V into 50 ohms (-8 V to +10 V open circuit).
2.9.2 LOWER LEVEL	Provides continuous control of the data output lower level from approximately -5 V to +4 V into 50 ohms (-10 V to +8 V open circuit).
2.10 EXTERNAL INPUTS	
2.10.1 CLOCK	Input connector for an external clock source. A 0 to +2 V pulse is required for trigger.
2.10.2 SYNC GATE	Input connector for a sync gate signal. A +2 V pulse is required for gating. The output occurs only during the time that the signal is applied.
2.10.3 RECYCLE	Input connector for a recycle command signal. A +2 V signal is required for recycling. A 16-bit word is generated for each recycle command signal.

2.11 SYNC OUTPUTS

2.11.1 CLOCK	Output connector for the clock sync. This sync output occurs at the data rate.
2.11.2 BIT 1	Output connector for Bit 1 sync. This sync output occurs approximately 20 ns before the first bit in each data cycle (16-bit word).
2.11.3 BIT 16	Output connector for Bit 16 sync. This sync output occurs approximately 20 ns before the last bit in each data cycle (16-bit word).

2.12 OUTPUT

2.12.1 TRUE	Output connector for positive true data. The amplitude and baseline are variable by means of the UPPER and LOWER level controls.
2.12.2 COMPLEMENT	Output connector for data that is the complement of the data at the TRUE output.
2.13 115/230 V Selector (Back Panel)	Selects the transformer primary configuration for either 115 or 230 V ac.

CHAPTER 3
OPERATION

3.1 FUNCTIONAL VERIFICATION

The following procedure provides a brief operational check of the instrument and an introduction to its controls.

3.1.1 Equipment (or equivalent) Required

a. A pulse source capable of 50 MHz repetition rate and +2 V amplitude. Systron-Donner Model 110B Pulse Generator recommended.

b. A dual-trace real-time oscilloscope with a 50 MHz bandwidth. Tektronix 546 with a Type 1A2 plug-in recommended.

c. Two 50 ohm, 2 watt terminations. Tektronix 011-0049-01.

d. Four 50 ohm coaxial cables (2-3 feet long) terminated with BNC connectors.

3.1.2 Data Output Verification

a. Set the instrument controls as follows:

Control	Setting
CLOCK RATE	10 kHz
CLOCK RATE vernier	fully clockwise
WIDTH	100 µs
WIDTH vernier	mid-range
DATA CONTENT	odd numbers depressed
FORMAT	NRZ depressed
RECYCLE	CONT depressed
UPPER LEVEL	+5
LOWER LEVEL	0
SYNC GATE	off
BIT 16	RZ

b. Monitor the TRUE and COMPLEMENT OUTPUTS on the dual-trace real-time oscilloscope. Trigger the oscilloscope from the BIT 1 SYNC OUTPUT. Terminate all three outputs with the 50 ohm, 2 watt terminations.

c. Set the oscilloscope controls to display one data cycle (16-bit word).

d. Verify that the odd numbered bits are true (+5 V logic level) for the entire bit period (approximately 100 µs) and the even numbered bits are false (0 V logic level) at the TRUE OUTPUT. Verify that the bits at the COMPLEMENT OUTPUT are the inverse of the bits at the TRUE OUTPUT.

e. Release the odd numbered DATA CONTENT pushbuttons and depress the even numbered pushbuttons. Verify that the even numbered bits are true (+5 V logic level) and the odd numbered bits are false (0 V logic level) at the TRUE OUTPUT. Verify that the bits at the COMPLEMENT OUTPUT are the inverse of the bits at

the TRUE OUTPUT. Verify that bit 16 returns to the lower logic level one bit period after it begins.

f. Using the OUTPUT LEVEL controls verify that the upper logic level of the data can be varied from approximately -4 V to +5 V and the lower logic level can be varried from approximately -5 V to + 4 V.

NOTE: Maximum difference between the upper and lower logic levels should be slightly greater than 5 volts.

g. Set the UPPER LEVEL control to +5 V and the LOWER LEVEL control to 0 V.

h. Depress the 50 MHz CLOCK RATE pushbutton and set the CLOCK RATE vernier fully clockwise. Verify that the clock rate is greater than 50 MHz. Set the CLOCK RATE vernier fully counterclockwise and verify that the clock rate is less than 10 MHz.

i. Check the remaining CLOCK RATE ranges and verify overlap at the upper and lower limits.

j. Depress the 10 kHz CLOCK RATE pushbutton and set the CLOCK RATE vernier fully clockwise.

k. Depress the RZ (FORMAT) pushbutton and verify that the bits are true (+5 V logic level) for approximately 50% of the bit period.

l. Rotate the WIDTH vernier counterclockwise and verify that the bit width decreases. Rotate the WIDTH vernier clockwise and verify that the bit width increases. Set the WIDTH vernier counterclockwise.

m. Sync scope on CLOCK SYNC output. Depress the PULSE (FORMAT) pushbutton and verify that the output changes from a data to a pulse format (pulse occurs approximately ever 100 µs).

n. Depress the NRZ (FORMAT) and the SYNC (RECYCLE COMMAND) push-button. Connect the external pulse generator to the RECYCLE INPUT. Set the external pulse generator for 100 Hz repetition rate, 20 ns width and +2 V amplitude (0 V baseline). Trigger the oscilloscope from the sync output of the external generator.

o. Verify that a 16-bit word is generated approximately every 10 ms. Verify that the 16th bit returns to zero 1 bit period after it begins. Set the BIT 16 switch to NRZ and verify that bit 16 remains true until the beginning of the first bit of the next data cycle.

p. Depress the ASYNC (RECYCLE COMMAND) pushbutton and verify that 16-bit words are generated at approximately a 10 ms rate.

NOTE: Only the first cycle of data output will be stable since the clock is not synchronized to the recycle input signal.

q. Disconnect the external pulse generator from the RECYCLE INPUT. Depress the MAN (RECYCLE COMMAND) pushbutton and verify that a 16-bit word is generated each time the pushbutton is depressed.

3.1.3 Sync Gate Verification

a. Set the instrument controls the same as in paragraph 3.1.2, step (a).

b. Connect the external pulse generator to the SYNC GATE INPUT. Set the pulse generator for 1 kHz repetition rate, +2 V amplitude (0 V baseline) and 500 µs pulse width.

c. Monitor the TRUE OUTPUT with the real-time oscilloscope. Trigger the oscilloscope from the sync output of the external pulse generator.

d. Set the SYNC GATE switch to ON.

e. Depress the PULSE (FORMAT) pushbutton and verify that the pulse output is gated.

3.1.4 Sync Output Verification

a. Set the instrument controls the same as in paragraph 3.1.2, step (a).

b. Monitor the TRUE and BIT 1 SYNC OUTPUTS on the dual-trace oscilloscope. Trigger the oscilloscope from the BIT 16 SYNC OUTPUT. Terminate all three outputs with the 50 ohm, 2 watt terminations at the oscilloscope.

c. Verify that BIT 1 SYNC OUTPUT has an amplitude of >+2 V and occurs approximately 30 ns before the first bit of the data output.

d. Disconnect the BIT 1 SYNC OUTPUT from the oscilloscope and monitor the BIT 16 SYNC OUTPUT. Verify that the BIT 16 SYNC OUTPUT has an amplitude of >+2 V and occurs approximately 30 ns before the sixteenth bit of the data output.

e. Disconnect the BIT 16 SYNC OUTPUT and monitor the CLOCK SYNC OUTPUT. Verify that the CLOCK SYNC OUTPUT has an amplitude of >+2 V and occurs at the data rate.

3.1.5 External and Manual Trigger Verification

a. Connect the external pulse generator to the CLOCK input. Set the pulse generator for a repetition rate of 10 kHz, an amplitude of +2 V (0 V baseline) and 20 ns width.

b. Monitor the TRUE OUTPUT on the real-time oscilloscope. Trigger the oscilloscope from the sync output of the external pulse generator. Terminate both outputs with the 50 ohm, 2 watt terminations.

c. Set the instrument controls the same as in paragraph 3.1.2, step (a) except depress the EXT (CLOCK RATE) pushbutton.

d. Verify that the instrument is triggered (data output occurs with a format corresponding to the position of the DATA CONTENT pushbuttons).

e. Verify that the instrument can be triggered from 10 Hz to 50 MHz.

f. Disconnect the external pulse generator. Trigger the oscilloscope from the BIT 1 SYNC OUTPUT.

g. Depress the MAN (CLOCK RATE) pushbutton several times and verify that the dc level of the TRUE OUTPUT changes in accordance with the setting of the DATA CONTENT pushbuttons.

CHAPTER 4
CALIBRATION

4.1 EQUIPMENT (or equivalent) REQUIRED

a. A real-time oscilloscope with a bandwidth of 50 MHz. Tektronix Type 546 with a 1A2 plug-in recommended.

b. A sampling oscilloscope with a 0.35 ns rise time. Tektronix Type 546 with a 1S1 plug-in recommended.

c. An electronic counter with a 50 MHz capability. Systron-Donner Model 6150 recommended.

d. A pulse source capable of 50 MHz repetition rate and >+2 V amplitude. Systron-Donner Model 110B recommended.

e. A digital voltmeter capable of reading millivolts. Systron-Donner Model 700A recommended.

f. Two 50 ohm, 2 watt coaxial terminations. Systron-Donner Type 2010 recommended.

g. Two 10X, 2 watt, 50 ohm attenuators. Tektronix 011-0059-01 recommended.

h. Several 50 ohm coaxial cables terminated with BNC connectors.

4.2 POWER SUPPLY CALIBRATION

a. Connect the instrument to the 115 V supply and set the POWER switch to ON. Depress the EXT (CLOCK RATE) pushbutton.

b. Monitor the +15 V buss with the digital voltmeter and adjust R529 for +15.00 volts.

c. Monitor the -15 V buss with the digital voltmeter and verify a reading of -15.00 ±0.3 V.

d. Monitor the +5 V buss with the digital voltmeter and verify a reading of +5.00 ±0.1 V.

4.3 CLOCK RATE CALIBRATION

a. Set the instrument controls as follows:

Control	Setting
CLOCK RATE	50 MHz
CLOCK RATE vernier	fully counterclockwise
FORMAT	PULSE
WIDTH	100 ns
WIDTH vernier	fully counterclockwise
UPPER LEVEL	+5 V
LOWER LEVEL	0 V

b. Monitor the TRUE OUTPUT on the counter. Terminate the output with the 50 ohm, 2 watt termination at the counter input.

c. Adjust C31 for a counter indication of approximately 9.5 MHz.

d. Set the CLOCK RATE vernier fully clockwise and verify that the clock rate is >50 MHz.

e. Check the remaining clock rate ranges for overlap at the upper and lower limits.

NOTE: Check the appropriate timing capacitors (C21 through C26) if it is not possible to get overlap on all ranges.

4.4 CLOCK WIDTH CALIBRATION

a. Set the instrument controls the same as in paragraph 4.3, step (a) except select the 10 MHz clock rate range.

b. Monitor TP1K with the sampling oscilloscope. Trigger the oscilloscope from the CLOCK SYNC OUTPUT. Adjust C82 for a clock pulse width of 8 ns.

4.5 BIT 16 RZ CALIBRATION

a. Set the instrument controls as follows:

Control	Setting
CLOCK RATE	50 MHz
CLOCK RATE vernier	fully clockwise
FORMAT	RZ
WIDTH	100 ns
WIDTH vernier	fully counterclockwise
BIT 16	RZ
RECYCLE COMMAND	SYNC
UPPER LEVEL	+5 V
LOWER LEVEL	0 V

b. Connect the external pulse source to the RECYCLE INPUT. Set the source for a repetition rate of 1 MHz and an amplitude of +2 V.

c. Monitor the TRUE OUTPUT with the sampling oscilloscope. Trigger the oscilloscope from the BIT 1 SYNC OUTPUT.

d. Depress all DATA CONTENT pushbuttons except number 15. Adjust C173 so that Bit 16 is true for the same period of time that Bit 16 is false.

4.6 WIDTH/RZ CALIBRATION

a. Set the instrument controls as follows:

Control	Setting
CLOCK RATE	1 MHz
CLOCK RATE vernier	mid-range
FORMAT	PULSE
WIDTH	100 ns
WIDTH vernier	fully clockwise
UPPER LEVEL	+5 V
LOWER LEVEL	0 V

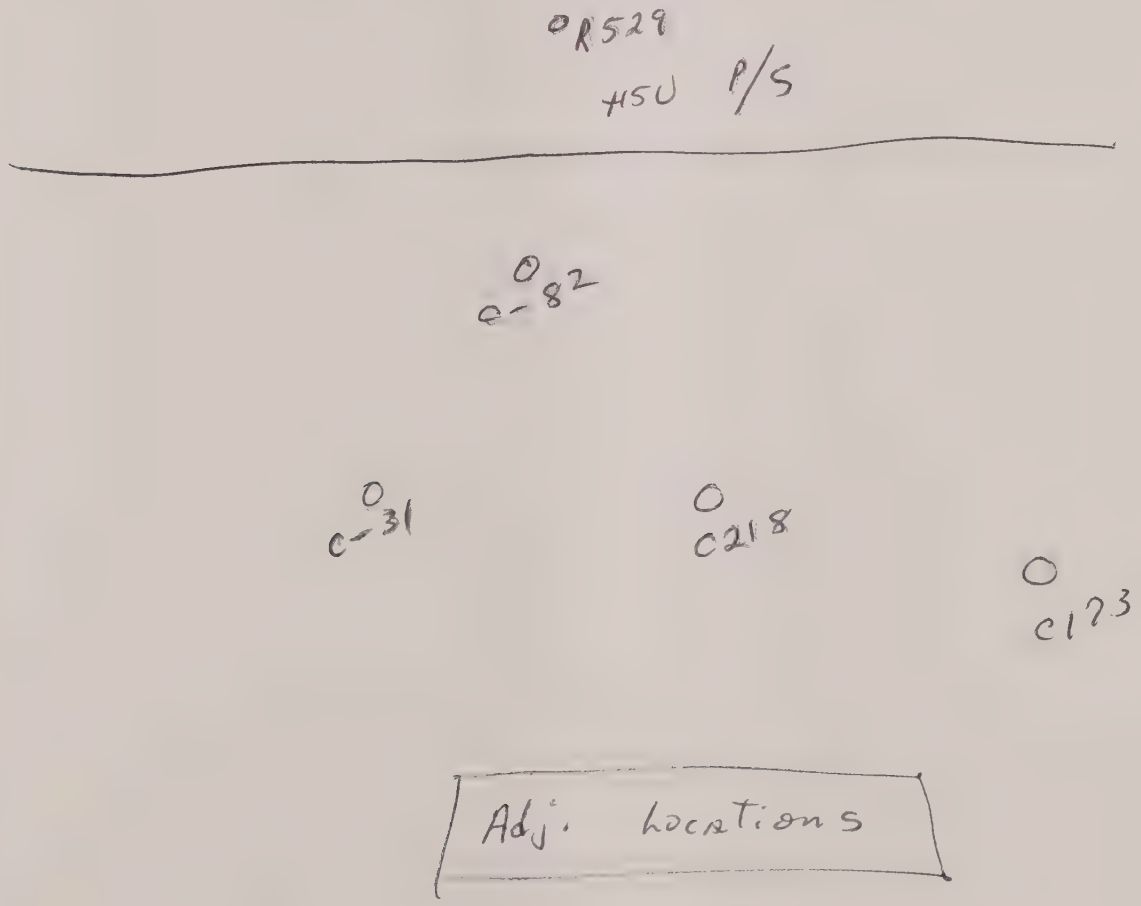
b. Monitor the TURE OUTPUT with the sampling oscilloscope. Trigger the oscilloscope from the CLOCK SYNC OUTPUT. Terminate both outputs with the 50 ohm, 10X attenuators.

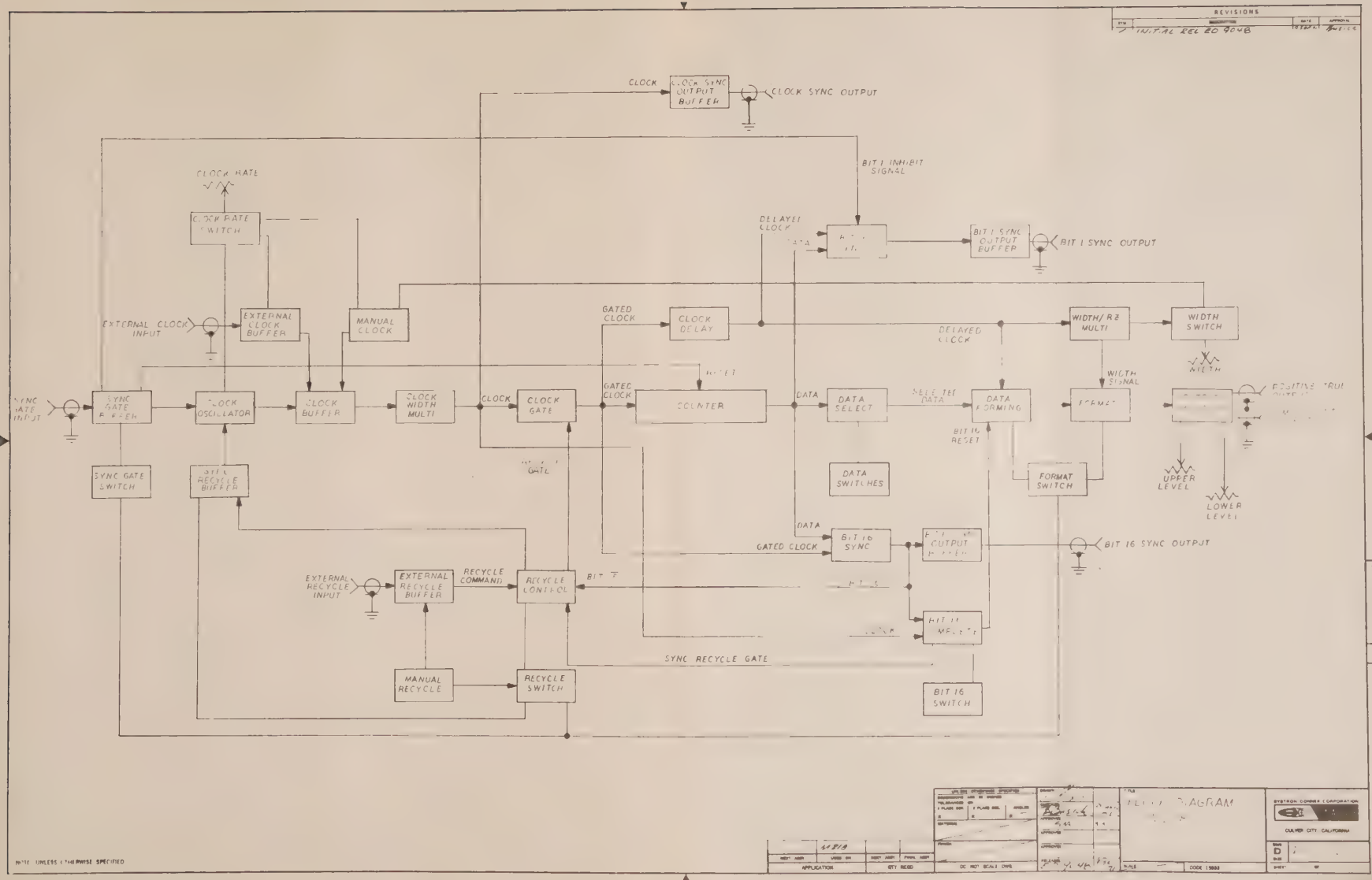
c. Adjust C218 for a pulse width of approximately 110 ns.

d. Set the pulse width vernier fully counterclockwise and verify a pulse width of approximately 10 ns or less.

e. Check the remaining width ranges for overlap at the upper and lower limit. Use the real-time oscilloscope to check all but the 1 µs and 100 ns ranges. Attenuate the OUTPUT and SYNC OUTPUT with the 50 ohm, 10X attenuator when using the sampling oscilloscope.

NOTE: If it is not possible to get overlap on all ranges, check the appropriate timing capacitor (C250 through C254).




REVISIONS
INITIAL REL 20 9048
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CLOCK SYNC OUTPUT
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CLOCK RATE
CLOCK RATE SWITCH
DELAYED CLOCK
BIT 1 SYNC OUTPUT BUFFER
BIT 1 SYNC OUTPUT
EXTERNAL CLOCK INPUT
EXTERNAL CLOCK BUFFER
MANUAL CLOCK
GATED CLOCK
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WIDTH/ R2 MULTI
WIDTH SWITCH
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WIDTH SIGNAL
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CLOCK BUFFER
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CLOCK GATE
GATED CLOCK
COUNTER
DATA
DATA SELECT
SELECTED DATA
DATA FORMING
FORMAT
POSITIVE TRUE OUTPUT
BIT 16 RESET
SYNC GATE SWITCH
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DATA SWITCHES
FORMAT SWITCH
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LOWER LEVEL
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BIT 16 SYNC OUTPUT
EXTERNAL RECYCLE INPUT
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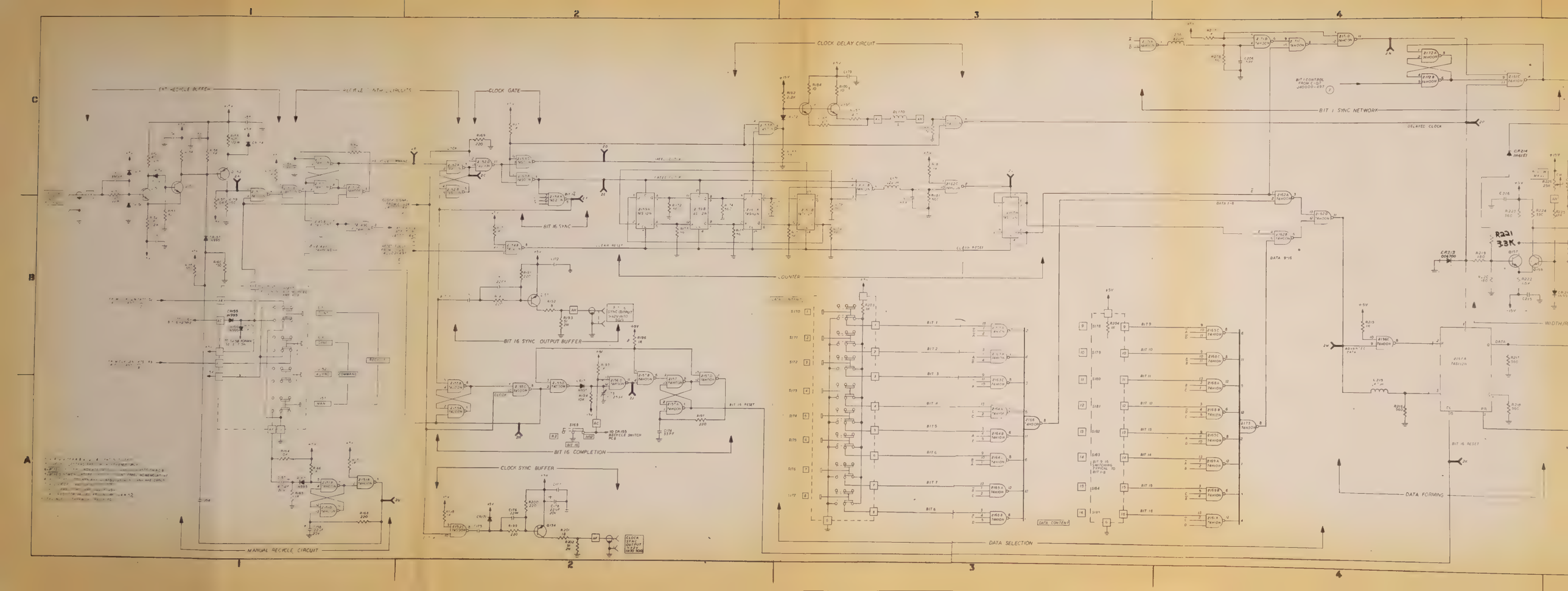
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BIT 16 SYNC OUTPUT BUFFER
BIT 16 COMPLETION
CLOCK SYNC BUFFER
COUNTER
BIT 1 SYNC NETWORK
DELAYED CLOCK
DATA 7-8
DATA 9-16
DATA SELECTION
DATA FORMING
MANUAL RECYCLE CIRCUIT
BIT 16 RESET
WIDTH
DATA
BIT 1
BIT 2
BIT 3
BIT 4
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BIT 8
BIT 9
BIT 10
BIT 11
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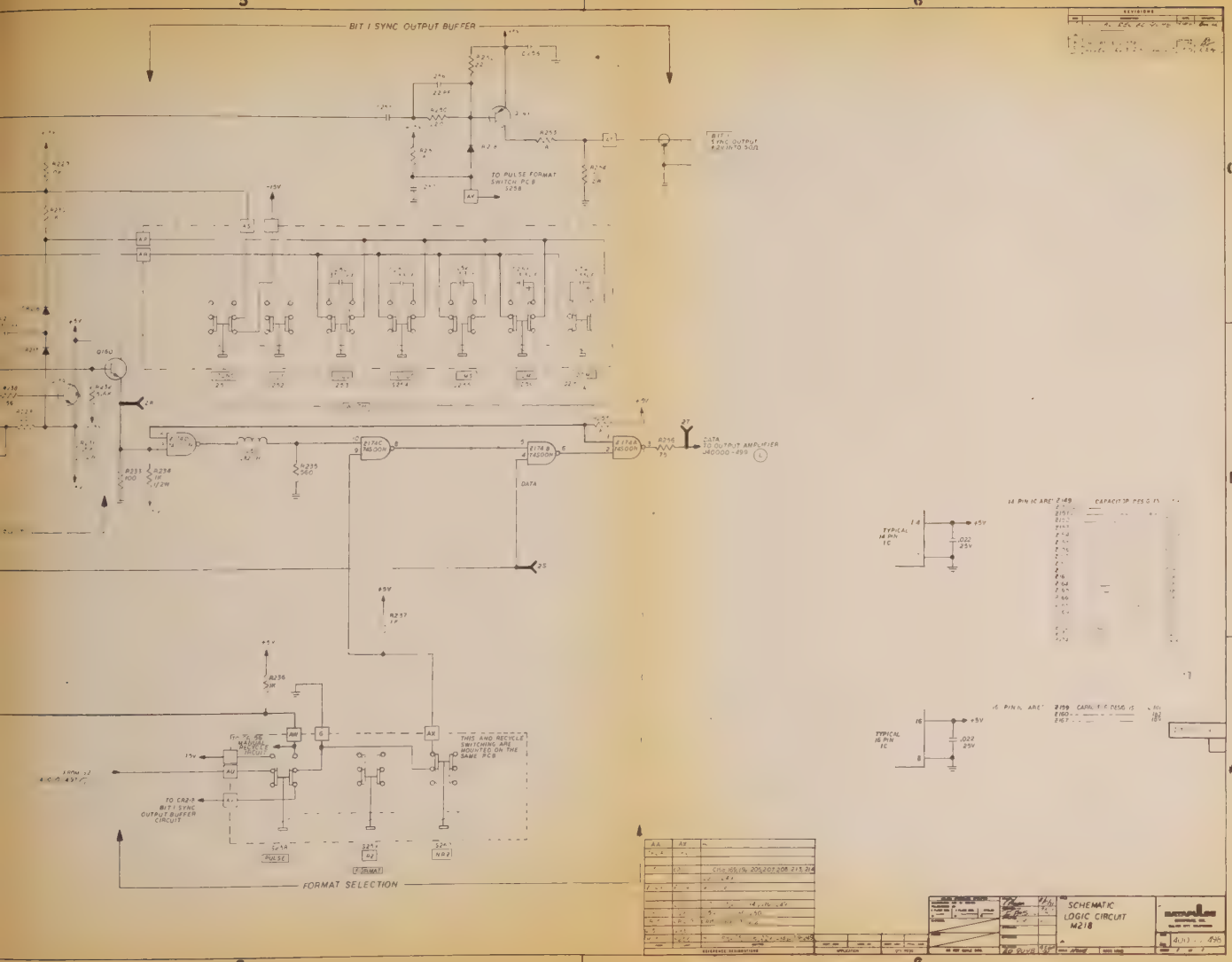
BIT 14
BIT 15
BIT 16
R221 33K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+5V
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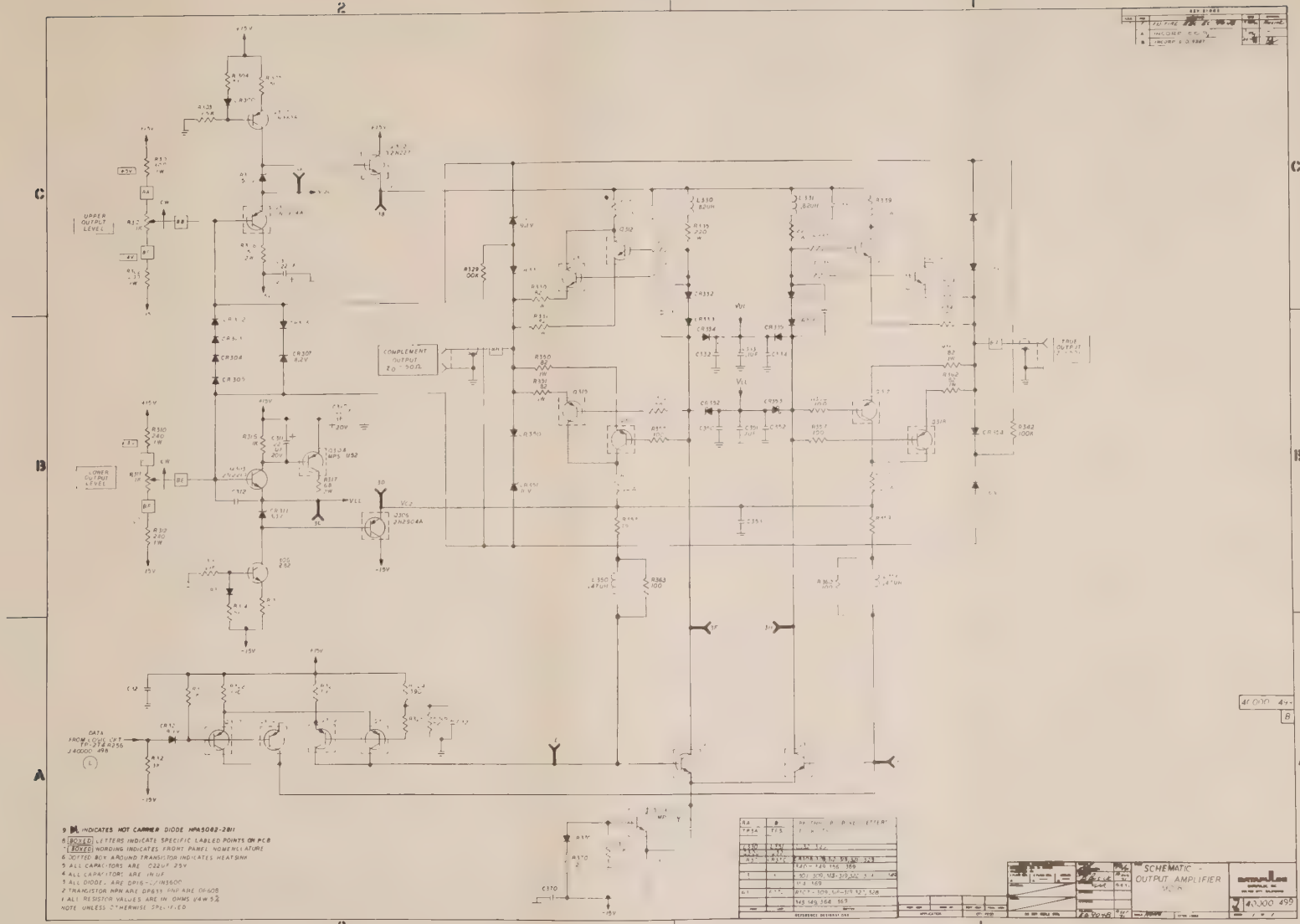
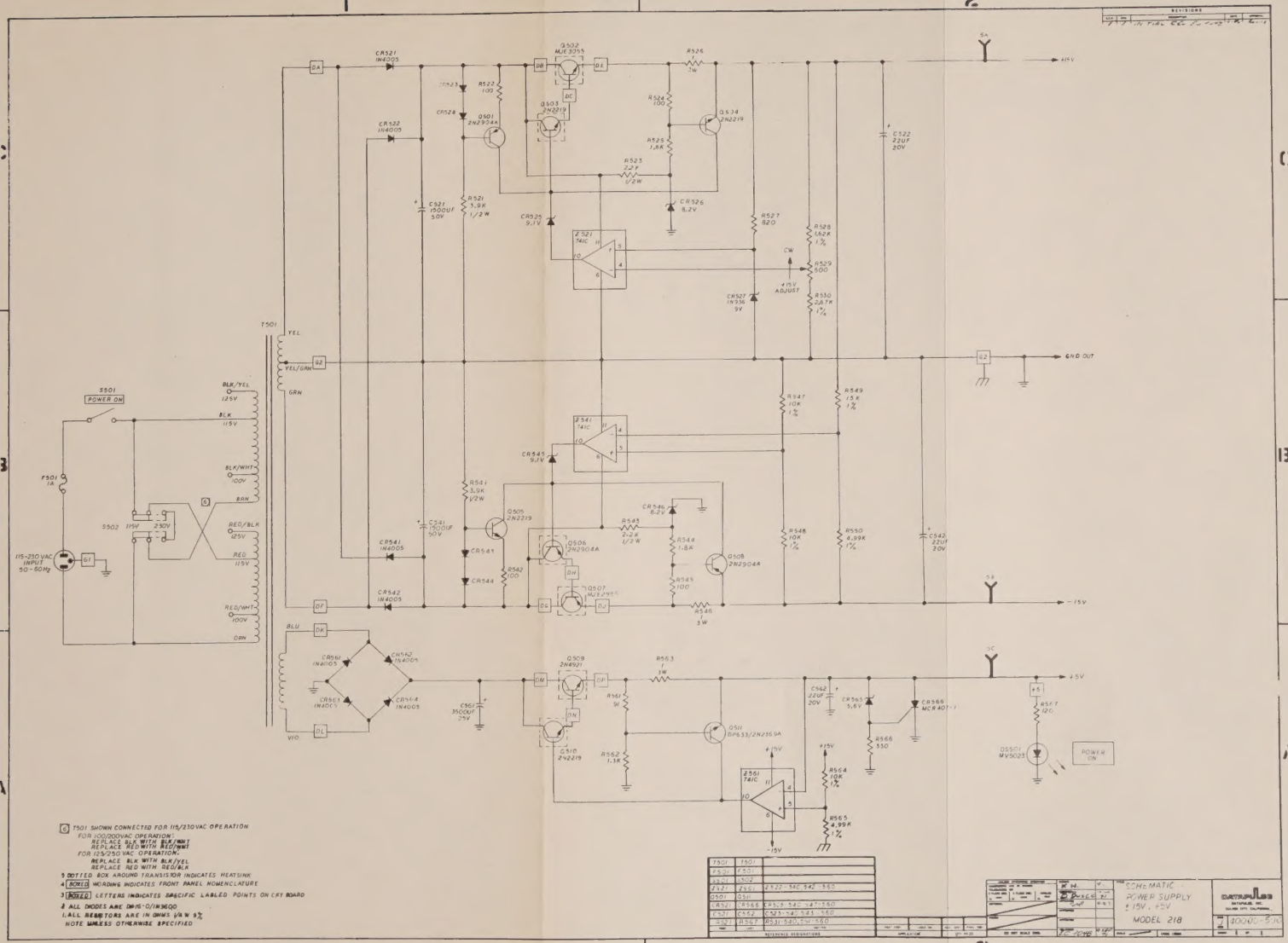
R234 1K 1/2W
R235 560
DATA
DATA TO OUTPUT AMPLIFIER 340000-49A
R237 1K
R236 5K
THIS AND RECYCLE SWITCHING ARE MOUNTED ON THE SAME PCB
TO CR21-B BIT I SYNC OUTPUT BUFFER CIRCUIT
PULSE
RZ
NRZ
FORMAT
FORMAT SELECTION
TYPICAL 14 PIN IC
.022 25V
TYPICAL 16 PIN IC
.022 25V
SCHEMATIC LOGIC CIRCUIT M218


SCHEMATIC - OUTPUT AMPLIFIER
UPPER OUTPUT LEVEL
LOWER OUTPUT LEVEL
COMPLEMENT OUTPUT Zo = 50Ω
TRUE OUTPUT Zo = 50Ω
DATA FROM CONT CKT TP 376 R356 J40000 498
9 INDICATES HOT CARRIER DIODE HP5082-2811
8 BOXED LETTERS INDICATE SPECIFIC LABLED POINTS ON PCB
7 BOXED WORDING INDICATES FRONT PANEL NOMENCLATURE
6 DOTTED BOX AROUND TRANSISTOR INDICATES HEATSINK
5 ALL CAPACITORS ARE .022uF 25V
4 ALL CAPACITORS ARE IN UF
3 ALL DIODES ARE DP16-/1N3600
2 TRANSISTOR NPN ARE DP653 PNP ARE DP608
1 ALL RESISTOR VALUES ARE IN OHMS 1/4W 5%
NOTE UNLESS OTHERWISE SPECIFIED



[6] T501 SHOWN CONNECTED FOR 115/230VAC OPERATION
FOR 100/200VAC OPERATION:
REPLACE BLK WITH BLK/WHT
REPLACE RED WITH RED/WHT
FOR 125/250 VAC OPERATION:
REPLACE BLK WITH BLK/YEL
REPLACE RED WITH RED/BLK

5 DOTTED BOX AROUND TRANSISTOR INDICATES HEATSINK

4 BOXED WORDING INDICATES FRONT PANEL NOMENCLATURE

3 BOXED LETTERS INDICATES SPECIFIC LABLED POINTS ON CKT BOARD

2 ALL DIODES ARE DHS-0/1N3600

1 ALL RESISTORS ARE IN OHMS 1/4 W 5% NOTE UNLESS OTHERWISE SPECIFIED

T501	T501
C521	C521
C522	C522
C541	C541
C542	C542
C561	C561
Q501	Q511
R521	R566
R527	R562
Q502	R547

C521-540-542-560
C523-540-543-560
R531-540-541-560

SCHEMATIC
POWER SUPPLY
+15V, +5V
MODEL 218

DATAPULSE
INCORPORATED
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